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(54) Title: METHOD FOR MARKING OF A VESSEL AND A HANDLING DEVICE FOR APPLYING OF THE METHOD

(57) Abstract

The object of the invention is a method for marking a container (2) for the identification of the samples which it contains, in which method the container (2) is placed in a holder (1) and the holder (1) includes a memory unit (5) into which the machine readable identification data for the identification of the container (2) in the holder (1) is stored. In addition, the object of the invention is an equipment for the application of the method. In order to improve the processing of the sample in the method according to the invention the identification data stored in the memory unit (5) is read by the reading device of the handling equipment (14) and by the instruments of the handling equipment the sample is processed in a predetermined way and the data concerning the processing is transfered into the memory unit. The handling equipment relating to the invention consists of a reading device for reading the identification data and the instruments for processing the sample.

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METHOD FOR MARKING OF A VESSEL AND A HANDLING DEVICE FOR APPLYING OF THE METHOD

The object of the invention is a method to mark a container
5   for the identification of the samples it contains, in which method the container is mounted in a holder, which has a memory unit for the storing of the machine readable identification data of the container in the holder. In addition, the object of the invention is the handling equipment for
10   the application of the method, as defined in the introduction part of the first device claim.

The present known method for marking the samples is that bar code labels are glued to a test tube containing, for instan-
15   ce, blood samples. This label is printed by a printer when the person who took the sample types the identification code of the patient e.g., his name, into the patient data system.

The basic blood sample is transferred to the hospital labo-
20   ratory where it is identified on the basis of the label glued to the test tube. After the patient who gave the sample is recognized by the bar code, the laboratory person-nel is able to find out which tests should be done to the blood sample, on the basis of the record they have access
25   to. On the basis of this, the basic blood sample is divided into partial samples by pipeting or by an automatic divider. A label is glued to the test tube of every partial sample and the necessary information needed for the identification of a patient is marked on the label either in plain text or
30   by bar code.

The partial blood samples are brought to analyzers for the necessary tests. The results of these tests and the informa-tion on the labels are registered and forwarded to the
35   doctor attending the patient.

The greatest drawback of the above mentioned known method is

that the samples or the results of the samples may be mixed
by human error making, naturally, the test results of the
blood samples of the patients unreliable. This kind of an
error may happen, for instance, in the process of dividing
5   the basic blood samples into partial samples in case the
person doing the dividing accidentally glues a wrong label
to a wrong test tube or in the registering of the results of
the analysis. Also, there may be problems in the dividing of
the sample into partial samples and/or in their handling.
10   One particular problem is the inconvenience of handling the
labels. The labels may come off or they are fastened so
tight that their removal in the cleaning is difficult.

The purpose of this invention is to solve the above men-
15   tioned problems and to offer for use a very reliable and
simple method and a handling equipment by which test tubes
can be marked for identification, identified and handled so
that there is no need for separate code labels and no risk
of mixing the samples of different patients. In addition,
20   the purpose of the invention is to introduce a method and a
handling equipment by which the sample can be handled fast,
reliably and in a predetermined way and by which all the
necessary data to process the sample is following with the
sample.
25

These goals are met by the method relating to the invention
and by the handling equipment, which are characteristic of
the claim 1 and of the first claim for equipment.

30   The invention is based on the idea that the identification
data stored in the memory unit is read by the reading device
of the handling equipment and the sample is handled, in a
predetermined way, by the handling equipment instruments and
the data necessary for the handling is transferred to the
35   memory unit. The sample is identified positively and reliab-
ly by the handling equipment. Furthermore, the sample can be
handled in a desired way, fast and securely, after the

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identification and the data needed for the processing and/or identification of the sample can be stored in the memory unit of the basic sample container or in the memory unit of further sample containers.

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The method is extremely usable for the handling of the blood samples of the patients in a hospital. The container, in this application, refers to a test tube or equivalent usable for the handling of blood samples, urine samples etc. The handling refers to the procedures done to the sample in the container. This kind of a procedure is for example the dividing of the basic blood sample into partial samples for processing in various analyzers.

In the preferred application of the invention an inductively readable memory is used as a memory unit. Data, which is machine readable, can be stored in the memory unit, without having to turn the test tube to a certain position. Thus, all the data pertaining to the sample will be stored in the memory unit immediately after taking the sample. The advantage of this is also that the memory unit is reusable unlike the known bar code labels and it can be used repeatedly or even washed.

According to the method all the data necessary for the handling of the sample is stored in the memory unit of the holder. In practice, this is not possible when using bar code labels because the data that can be included in one bar code label is very limited. Because all the data necessary for the handling of the sample is readable from the memory of the holder, from where it can be transferred to the memory unit of the holder of the partial sample containers in the process of dividing the basic sample, the persons handling the sample do not need to use other information sources while handling the sample. The use of labels and equivalent marking divices is no more necessary. The marking of partial samples is easier because the handling equipment

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used in this method is a dividing device, because the divi-
ding device automatically transferres the identification
data from the memory unit of the holder of the basic blood
sample into the memory unit of the holder of the respective
5   partial blood sample. The most remarkable advantages of the
method related to the invention are the minimizing of the
chances of human error, the possibility of having simple and
reliable information about what has to be done to the sample
for example into how many partial samples it has to be divi-
10   ded and the possibility to find fast and simply, without the
need of labels or equivalent devices, a specific sample
among other similar ones just by reading the identification
data in the memory unit of the holder.

15   In addition, the object of the invention is the handling
equipment of the sample, characterized in that the handling
equipment consists of a reading device for reading the
identification data stored in the memory unit of the holder
and of the instruments to handle the sample, identified by
20   the identification data of the container, in a predetermined
way. The most significant advantage of the handling equip-
ment is that it automatically performs the predetermined
measures to the sample like, for instance, divides it into
partial samples after the handling equipment has identified
25   the sample by the identification data stored in the memory
unit of the holder. Thus, for instance, such a situation is
avoided that a person handling a certain sample by mistake
performs measures intended for another sample. Still, if he
for instance does not divide the sample into sufficient
30   number of portions, it is possible that there are not enough
partial samples for all the analyzers needing partial samp-
les.

In a preferred embodiment of the handling equipment accor-
35   ding to the invention, the handling device is a dividing
device for dividing the basic blood sample into partial
samples, which dividing device is equipped with instruments

to store the identification data it reads from the memory
unit of the basic sample into the memory unit of each par-
tial sample holder. Besides being simple, the most signifi-
cant advantage of this method is the fact that the chance of
5   human error is completely eliminated in the process of
marking the sample for identification.

In the following, the invention is explained in greater
detail with reference to the attached drawings, in which
10   Figure 1 shows a holder employed in the method,
Figure 2 shows a data terminal employed in the method of the
invention, and
Figure 3 shows a preferred application of the equipment
related to the method of the invention.
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Figure 1 shows the side view and partial cross-section of a
holder 1. As illustrated in Fig. 1 a container 2, suitable
for handling a blood sample or any other equivalent sample,
is placed in a plastic holder 1. The container is a test
20   tube which is properly closed by a plug 3. Both the holder
1 and the container 2 are of long cylindrical shape and
round when viewed from above.

The diameter of the vertical cavity, open at the top, of the
25   holder 1 is a bit smaller than the outside diameter of the
holder 2. The walls of the holder 1 flex out by the pressure
applied to them by the insertion of the container 2 into the
vertical cavity of the holder. This flex-out is further
helped by the vertical slot on the wall of the holder, which
30   slot has the shape of the letter "U" as seen in Fig. 1.
Besides helping the flex-out of the holder and the fastening
of the container 2 into the holder 1, the slot makes it
possible to see the filled amount inside the transparent
container 2 even though the container is placed in the
35   holder 1. The amount of fill may be estimated, depending on
the situation, either by viewing or by automatic devices.

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There is a cylindrical cavity underneath the bottom level of the vertical cavity of the holder 1. The memory unit 5 is attached into this cavity. The memory unit consists of a memory circuit, a sender, a receiver and a coil. The memory
5   unit 5 is an inductively readable memory device the principle of which is described, for instance, in the FI-patent publication 85 079. Both the holder 1 and its memory unit are washable. The capacity of the memory circuit of the memory unit 5 is so designed that it can store the data of
10 the patient who has given the blood sample in the container 2 and the data for the handling procedures of the blood sample in the container. Here the handling procedures refer to the analyses which have to be done to the blood sample. So the data in the memory circuits of the memory unit 5 is
15 informative, for instance, as to who is the donor of the blood sample and the number of the analyses, in other words, into how many portions the blood sample in the container 2 has to be divided. All the data in the memory circuit is inductively readable which means that the data can be read
20 without having to set the read head of the reading device in physical contact with the holder 1. There is no need to turn the holder into a certain position in relation to the read head, but the data can be read from the memory circuit just by bringing the memory circuit close to the read head of the
25 reading device.

The bottom face of the holder 1 and the attached memory are perpendicular to the vertical centerline of the holder 1 and of the container 2, so the holder 1 stays in an upright
30 position, as shown in Fig. 1, when it is put for instance on a table. Because of the holder 1, even the test tube 2 with a spherical bottom stays upright when placed in the holder 1.

35 Figure 2 shows a portable data terminal 7, employed in a preferred application of the method of the invention. This data terminal can write and read data into and from the

memory unit attached to the holder 1 in Fig. 1. The handheld
terminal consists of the display 9 and the keyboard 11. To
read or write data the holder 1 is brought close to the wri-
ting/reading head 8 of the terminal 7. Thus the data trans-
5   fer between the memory unit of the holder and the terminal
7 is inductively performed. The advantageous wireless data
transfer between the terminal 7 and the data system of the
hospital enables the storing of the identification data for
instance the names of those patients, who need to give a
10   blood sample, into the terminal 7. After the blood sample is
taken, the name of the patient is fed into the handheld
terminal 7 through the keyboard and simultaneously the
holder and the container holding the blood sample   are
brought close to the reading head of the handheld terminal.
15   The data of the handling procedures of the blood sample is
inductively transferred into the memory unit of the holder
1.

Figure 3 shows a preferred embodiment of the equipment
20   according to the invention. The blood samples of the pa-
tients and the tests to be done to the blood samples of each
patient are fed into the hospital data system 12. Into the
data system is also fed the data of all the analyzers 13 in
the hospital, so the system is capable of deciding which
25   analyzer or analyzers will perform the tests to the blood
sample. The portable terminal 7 and the hospital data system
have an advantageous wireless connection. This way the data
of necessary blood samples can be transferred to the ter-
minal 7. Accordingly, the nurse taking blood samples of the
30   patients will have the information about who is to give a
blood sample.

The blood sample is put in a container for example in the
test tube 2 as shown in Fig. 1 and the test tube is placed
35   in the holder 1 as shown in Fig. 1. The container holding
the blood sample and the holder are brought close to the
writing/reading head of the terminal 7 and by typing a code

through the terminal keyboard the patient, who gave the sample, is identified. After the identification of the patient the data of the patient and the data concerning the tests that have to be done to the blood sample are transfer-
5   red by the terminal to the memory unit attached to the holder 1.

After the blood samples have been taken, the containers holding the blood samples are transferred to the dividing
10   device 14. The dividing device has a reading head for rea-
ding the data from the memory unit attached to the bottom of the holder 1. The reading head inductively reads the data from the memory unit. This data tells the following; who is the patient who gave the blood sample, into how many partial
15   samples the blood sample in the container is to be divided and by which analyzers the tests to the blood sample are to be performed. On the basis of this information the blood sample in the container is divided into partial samples by the dividing device, and the partial samples are placed in
20   containers to be transferred to various analyzers. The container, in which the basic blood sample has been, is transferred away from the dividing device to be washed and reused. The containers, into which the partial samples are placed, have memory units too and therefore while filling
25   the partial sample containers, the dividing device inducti-
vely writes the identification data of the partial sample into the holder of each partial sample.

The filled containers of the partial samples are transferred
30   to the analyzers 13, which perform the necessary analyses. During the process of analyzing the identification data of the patient is read from the holder of each respective partial sample for example the name of the patient. This particular identification data and the results of the per-
35   formed analysis are fed into the hospital data system 12, where the doctor attending the patient can read it. In Fig. 3 the arrows starting from the right side of the analyzers

13 represent the data flow from the analyzers 13 into the hospital data system 12.

In another embodiment according to the invention only the
5   data needed to identify the patient is stored in the memory
of the holder 1 by the handheld terminal 7. In this particu-
lar application the dividing device 14 and the analyzers 13
are directly connected to the hospital data system 12 ena-
bling them to receive other necessary information directly
10 from the data system after the holder 1 has been identified
by the identification data stored in its memory. For exam-
ple, the dividing device 14 receives the information, con-
cerning into how many portions the basic blood sample has to
be divided, directly from the hospital data system 12. This
15 is made possible by the identification data stored in the
memory of the holder 1. Accordingly, the memory of the
holder 1 can be minimized.

The above description and the related drawings must not be
20 understood to limit the applications of the invention, but
strictly illustrative. It shall be noticed that regardless
of what has been said earlier about utilizing the invention
in the handling of a blood sample, the invention can be
utilized as well in the handling of any other sample like,
25 for instance, in the handling of animal urine sample. Also,
the reading and the writing of the memory do not necessarily
need to be inductive, but any other similar technique can be
applied. The method of the invention and the handling equip-
ment can be varied within the scope of the annexed claims.

CLAIMS

1. A method for marking a container (2) for identification,
in which method the container (2) is placed in a holder (1),
5   and the holder (1) includes a memory unit (5) into which
machine readable identification data of the container (2) in
the holder (1) is stored, c h a r a c t e r i z e d   in
that the identification data stored in the memory unit (5)
is read by the reading device of the handling equipment (14)
10·   and by the instruments of the handling equipment the sample
is processed in a predetermined way and the information
related to the process is transferred to the memory unit.

2. A method as defined in claim 1, c h a r a c t e r i -
15   z e d   in that the memory unit (5) used in the method is an
inductively readable memory consisting of a memory circuit,
a sender, a receiver and a coil.

3. A method as defined in claim 1 or claim 2, c h a r a c -
20   t e r i z e d   in that during the handling process the
partial samples are placed by the handling equipment (14) in
containers (2), to the holders (1) of which the memory unit
(5) is attached and that the identification data read from
the memory (5) of the holder (1) of the basic sample is
25   stored by the handling equipment (14) into the memory unit
(5) attached to the holder (1) during the dividing.

4. A method as defined in claim 3, c h a r a c t e r i -
z e d   in that the sample in the container (2) is a blood
30   sample, the blood sample in the container (2) is divided
into partial samples by the dividing equipment, and that the
dividing equipment (14) reads from the memory unit (5) of
the holder (1) of the basic sample the number of the neces-
sary partial samples.
35
-      5. A handling equipment for processing the sample in the
container in a predetermined way, the container (2) being

placed in the holder (1) and to the holder (1) a memory unit
(5) being attached for the storing of identification data,
c h a r a c t e r i z e d in that the handling equipment
(14) consists of a reading device for reading the identifi-
5   cation data stored in the memory unit (5) and the instru-
ments for processing the sample in the container (2) identi-
fied by the identification data in a predetermined way and
for transferring the data related to the processing into the
memory unit.

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6. A handling equipment as defined in claim 5, c h a r a c-
t e r i z e d in that the handling equipment (14) is a
dividing device, by which the basic sample is divided into
partial samples on the basis of the information included in
15   the identification data of the sample and concerning the
handling of the sample.

7. A method as defined in claim 5 or claim 6, c h a r a c -
t e r i z e d in that the memory unit (5) is an inductively
20   readable memory consisting of a memory circuit, a sender, a
receiver and a coil.

8. A handling equipment as defined in claims 5 - 7, c h a -
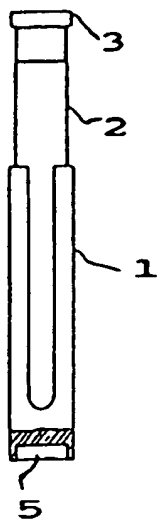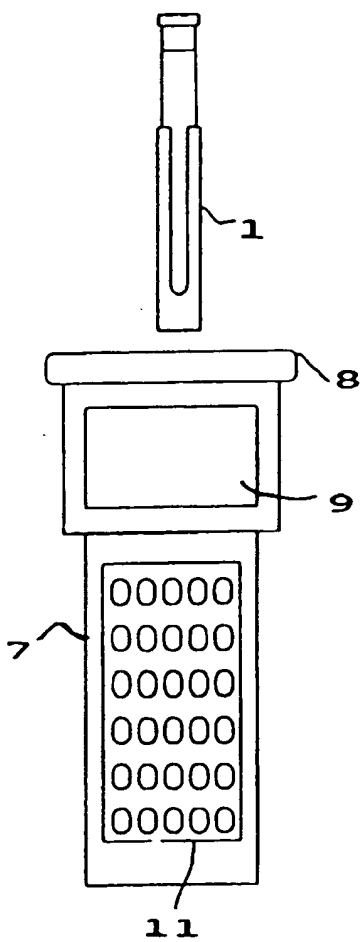r a c t e r i z e d in that the sample mentioned is a blood
25   sample.

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FIG. 1
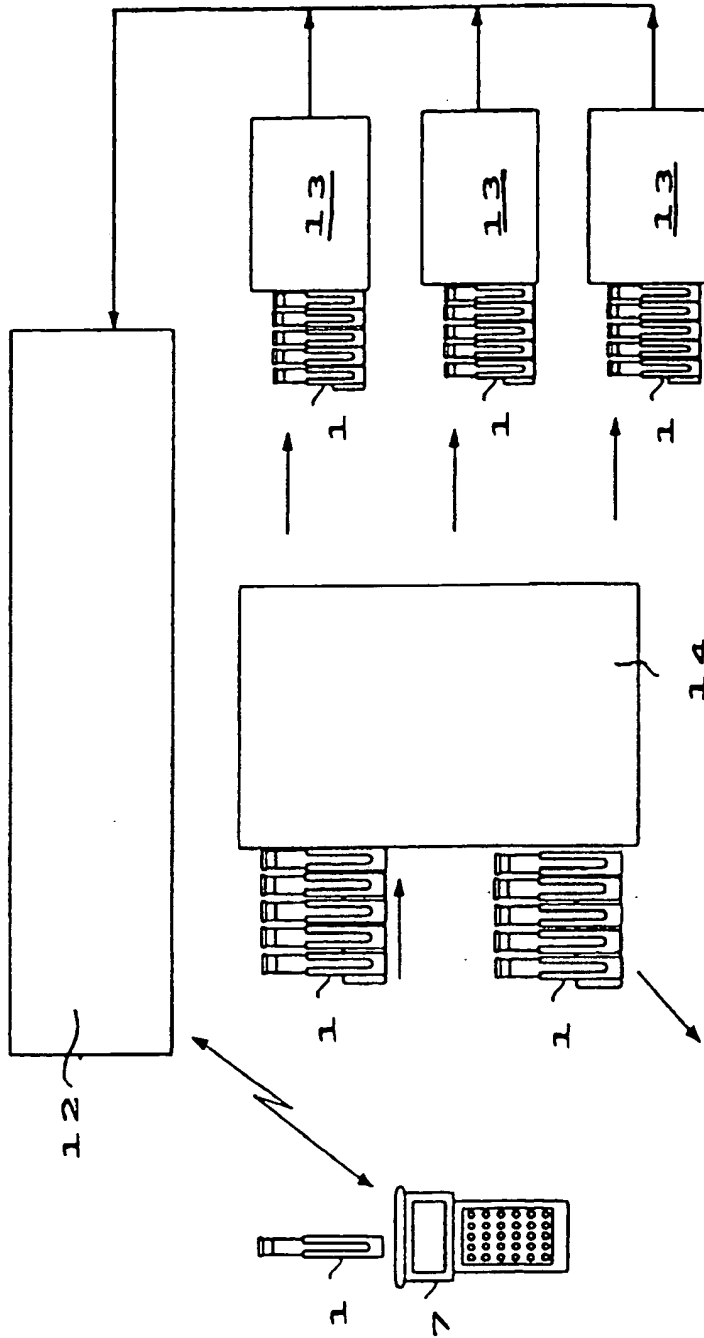

FIG. 2

FIG. 3

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65G 47/19, G01N 35/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65G, G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 3526125 (S.R. GILFORD ET AL), 1 Sept 1970 (01.09.70), column 5, line 5 - line 8, figure 7, claim 1	1,5,8
A	EP, A2, 0243915 (ITOH, TERUAKI), 4 November 1987 (04.11.87), page 9, line 17 - line 23, figures 1,2	1-8
A	US, A, 3660638 (RUDOLF OBERLI), 2 May 1972 (02.05.72), claim 1	1-8
A	EP, A2, 0351988 (QUATRO BIOSYSTEMS LIMITED), 24 January 1990 (24.01.90), claims 1,2	1-8

[X] Further documents are listed in the continuation of Box C.   [X] See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 April 1995	0 9 -05- 1995

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A1, 0039145 (LABSYSTEMS OY), 4 November 1981 (04.11.81), claim 1	1-8

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